JANUARY, 1961
Vol. IX, No. 3

BUSINESS BUDGETING

IN THIS ISSUE

NATIONAL SOCIETY FOR BUSINESS BUDGETING
NSBB
PLANNED PROFITS

BUSINESS BUDGETING

Official Publication of The
National Society for Business Budgeting

Editor — Neil F. Denen
P.O. Box 344, Moline, Ill.

Circulation Manager — Melvin C. Aichholz
P.O. Box 448, Cincinnati 44, Ohio

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BUSINESS BUDGETING is published bi-monthly by the National Society for Business Budgeting at 6914 Miami Road, Cincinnati 27, Ohio. Second-class postage paid at Cincinnati and at additional entry office. Subscriptions $10 for one year. SEND FORM 3579 to P.O. BOX 448, CINCINNATI 44, OHIO.

USE OF O.R. MATRICES IN PRODUCTION BUDGETING

$$a = \frac{q \cdot P_c}{P_p}$$

$$X_i = X_{ii} + P_i \qquad a_{ij} = \frac{X_{ij}}{X_i}$$

$$P = X - A \cdot X$$

by
Henry Ludmer
Professor of Management
Roosevelt University

Operations research techniques are here applied to a budgeting problem. Specifically, the use of the matrix forms utilizing the input-output model is illustrated. The sample problems at the end of the article are worthy of detailed study.

INTRODUCTION

Operations Research is the exacting application of the scientific method and higher mathematics for predicting quantitatively the most effective results of an operation under given sets of variable conditions. Thereby it reduces guesswork, narrows the area of choices of action in decision making, supports judgement with facts and provides executives with a guide by the collection, classification, analysis, and synthesis of all data. It does not eliminate judgement.

The techniques employed in operations research include

a. Matrix algebra
b. Statistical methods
c. Linear Programming
d. "Monte Carlo" sampling
e. Symbolic logic
f. Queueing theory
g. Decision theory
h. Automatic feedback control
i. Game theory
j. Information theory
k. Multivariate sampling and analysis
l. Probability theory
m. Conceptual models.

Operations research has been successfully used in Military Logistics and in the following civilian fields:

a. Commodity markets
b. Communications
c. Inventory control
d. Labor Stabilization
e. Research Planning
f. Sales forecasting
g. Assembly line balancing
h. Transportation scheduling
i. Warehouse location
j. Product mix, etc.

This research paper, however, deals with the application of matrix forms in production budgeting utilizing to some extent the input-output model. Therefore the input-output model is explained first and the budgeting methods are developed later on. The input-output treatment as conceived by Leontieff is merely concerned with finding out a bill of materials from a given bill of goods. The methods discussed here are more extensive in their application to derive production schedules, labor requirements, and contribution of out-of-pocket expenses. The utility of these methods increases with the number of different items in production.

THE INPUT-OUTPUT MODEL

Input-output, according to an author on the subject, is essentially a theory of production. The truth of this statement will be evident when we examine the assumptions that underlie the analysis.

The model: An example of an input-output matrix is as follows

X_i	X_{i1}	X_{i2}	X_{i3}	P_i
50	10	5	15	20
95	52	—	12	31
22	—	5	10	7

The X_{i1}, X_{i2}, and X_{i3} represent costs of commodities 1,2,and 3 respectively that go into the

sents the revenue from the sale of product i, making of the product i. The column X represents while the column P represents the difference between revenue from sales and costs of commodities considered.

$$X_i = X_{i1} + X_{i2} + X_{i3} + P_i$$

or, more generally $X_i = X_{ij} + P_i$

It is necessary to have all figures in the matrix, in some common unit and since we are considering quantities and costs, the dollar is the most practical unit.

If we now define an input-output coefficient

$$a_{ij} = \frac{X_{ij}}{X_i}$$

Our matrix then becomes of the form

$$X_i = a_{ij} \cdot X_i + P_i$$

We next conceive of a_{ij}, X_i and P_i as being 3 separate matrices A, X and P. The input-output matrix can then be expressed by the following inter-relationships.

The matrix inter-relationships

$X = A.X + P$

$P = X - A.X$

$P = (I - A)X$ I is an identity matrix

The Xij matrix is A.X

The assumptions: The assumptions underlying the input-output matrix are as follows

1. the input commodities are not interchangeable or substitutable. Each product has only one recipe of inputs. This assumption is perfectly valid for a manufacturing firm and in any case, is more valid than it is for the general economy.
2. constant returns to scale. This assumption emphasizes that the proportion of inputs going into a product cannot be changed, regardless of the quantity of product. This assumption is also perfectly valid for a manufacturing organization. Input commodities like fixed and semi-variable costs, infringe this assumption and therefore should be excluded from the matrix.
3. perfect divisibility of input and output. This implies that there should not be any restrictions on quantities or manipulations like rounding off to lot sizes. This applies only to the treatment of the matrix and does not prohibit us rounding off the results in the final tabulation or adding in the scrap allowances.

THE USE OF THE MODEL IN BUDGETING

In the last chapter we explained how the assumptions for the model are very well satisfied by phenomena prevailing in manufacturing organizations. Any commodity or factor of production which is strictly proportional to the output, is eligible for inclusion in the matrix. We can therefore see that, besides materials and supplies, we can also include the direct labor costs. Fixed and semi-variable costs, strictly speaking, should not be included in the matrix, but even here the variable component of the semi-variable costs can be separated and included.

To use the model at all, we need to know three matrices, the X matrix, the A matrix and the P matrix. The X matrix is the final goods matrix. This is established directly from the sales forecast, and grouped in a single-column matrix. The order in which the products are listed is arbitrary, but the same order should be followed in all subsequent matrices, and the end-result matrices will also be in the same order.

When we come to the A matrix, we find we have to deviate from the input-output model, and for very practical reasons. In input-output terminology,

$$a_{ij} = \frac{X_{ij}}{X_j}$$

For a manufacturing firm, a coefficient like a_{ij} is very difficult to estimate and even if done, must be changed from year to year. We shall therefore, for our purposes, redefine the A matrix to be composed of a_{ij} terms such that

$$a_{ij} = \frac{X_{ij}}{X_i}$$

The figures for a_{ij} can be established from master bills of materials, past production records, from standard data, engineering specifications, estimators' reports etc. Most frequently master bills and standard data deal with quantities. To convert them to dollar values, the following formula is useful.

$$a = \frac{q \cdot P_c}{P_p}$$

a the a_{ij} term in the A matrix

q the quantity of commodity required per unit of output

P_c the price of commodity per unit

P_p the price of product per unit

The third matrix is the P matrix, which shows the price of each commodity. It would be a single row matrix.

Matrix computation — The matrices in this case are convenient forms of tabulation of data, and subsequent handling of the data. We do not make use of matrix algebra in the classical sense, but rather we make use of simple sequences of multiplication and addition.

Application I — for finding the bill of materials — Each term in the ith row of the A matrix is multiplied by X . We thus form a new matrix B of the same size as the A matrix. The values in this new B matrix give us directly the total dollar value of each commodity going into each product. If we now divide each jth column (in the B matrix) by the jth term in the C matrix, we form a new matrix, the Q matrix. The terms in the Q matrix represent the quantities of each commodity used in each product.

Application II — for finding the schedule of labor requirements — In the foregoing pages it was mentioned that direct labor could be included in the commodity matrix A. Therefore the Q matrix we derived while finding the bill of materials, should contain one column for direct labor. This column immediately indicates the labor requirements in man-hours for each product.

Application III — to find the prime costs for each product — In application I, we found the B matrix, representing the total dollar value of each commodity going into each product. If we now take the row totals of the B matrix, we form a single-column matrix, S. This matrix gives the prime costs (material and labor) for each product.

Application IV — to find the contribution to out-of-pocket costs from each product — In application III, we developed an S matrix for prime costs. If we deduct the S matrix from the X matrix, we get a new single column matrix T, which gives us the contribution to out-of-pocket costs from each product.

Other applications — Similar treatment is feasible, we have already said, for any costs or expenses which are proportional to the quantity of the product. Among such items we include the variable component of the semi-variable expenses, sales commissions, certain distribution costs, freight costs etc.

Budgeting — Once the different schedules of requirements, as explained above, are arrived at, it becomes an easy matter to embody them in budget form. The X matrix is set up for a particular time period — month, quarter, or year, and all the subsequent schedules pertain to the same period. The use of these matrices are not restricted to budgets, they can be used for production scheduling, for purchasing, for finance-planning etc.

Variances — At the end of the budgeted period, records of actual usage of commodities become available. We also obtain actual sales figures. All these data can be set up in corresponding matrix form, and the different variances computed. By comparing the actual sales figures matrix with the X matrix, the output variances can be found. By comparing the usage quantities matrix with the Q matrix, we find the usage variances. By comparing actual prices with the C matrix, we find the price variances.

SUMMARY AND CONCLUSIONS

In the foregoing pages we have seen how it is possible to use matrix forms in budgeting. The points of agreement and the points of difference between such procedure, and input-output analysis has been indicated. We have also made mention of the fact that this is not a new technique, but a tool which is very concise and precise.

The question may very well be asked whether the method is high-powered enough to warrant dabbling with matrices. To this the answer is simply — It depends on the numerousness of the products and the commodities; the greater their number, the greater the time-saving advantage. In this connection, reference may be made to Dr. Andrew Vazsonyi's application of matrix forms to production scheduling. Dr. Vazsonyi's methods are not unique, production-scheduling can be done by several different and time-honored methods; but this still leaves scope for profitable application of Dr. Vazsonyi's method.

The method suggested in this paper is general enough in nature to be applied to many kinds of planning in manufacturing organizations. Inasmuch as budgeting is one type of planning, the method is applicable to budgeting and budgetary control.

(Please see sample problems on pages following.)

SAMPLE PROBLEMS

by Dr. Henry Ludmer

A GENERAL TYPE OF PROBLEM IN LINEAR PROGRAMMING THAT CAN BE SOLVED BY THE SIMPLEX METHOD*

PROBLEM:

A COMPANY PRODUCES FOUR PRODUCTS EACH OF WHICH MUST GO THROUGH FIVE PROCESSES. WITH THE FOLLOWING DATA FIND THE COMPANY'S OPTIMUM PRODUCTION.

PROCESS	TIME/UNIT OF PRODUCT				
	PRODUCT 1	PRODUCT 2	PRODUCT 3	PRODUCT 4	TOTAL TIME
A	t_{1A}	t_{2A}	t_{3A}	t_{4A}	T_A
B	t_{1B}	t_{2B}	t_{3B}	t_{4B}	T_B
C	t_{1C}	t_{2C}	t_{3C}	t_{4C}	T_C
D	t_{1D}	t_{2D}	t_{3D}	t_{4D}	T_D
E	t_{1E}	t_{2E}	t_{3E}	t_{4E}	T_E

PROFIT/UNIT OF 1 $= P_1$
" " " 2 $= P_2$
" " " 3 $\doteq P_3$
" " " 4 $= P_4$

LET Y_i = SLACK VARIABLES
WHERE i = PROCESS
Z = TOTAL PROFIT
X_h = No. OF EACH PRODUCT
WHERE h = PRODUCT

THE SET UP IS AS FOLLOWS:

FOR PROCESS A	$t_{1A}X_1 + t_{2A}X_2 + t_{3A}X_3 + t_{4A}X_4 + Y_A$	$= T_A$
" " B	$t_{1B}X_1 + t_{2B}X_2 + t_{3B}X_3 + t_{4B}X_4 + Y_B$	$= T_B$
" " C	$t_{1C}X_1 + t_{2C}X_2 + t_{3C}X_3 + t_{4C}X_4 + Y_C$	$= T_C$
" " D	$t_{1D}X_1 + t_{2D}X_2 + t_{3D}X_3 + t_{4D}X_4 + Y_D$	$= T_D$
" " E	$t_{1E}X_1 + t_{2E}X_2 + t_{3E}X_3 + t_{4E}X + Y_E$	$= T_E$
PROFIT	$P_1X_1 + P_2X_2 + P_3X_3 + P_4X$	$= Z$

*THIS METHOD IS A SERIES OF REPETITIVE OPERATIONS WHICH CONTINUALLY APPROACH AND FINALLY GIVE THE OPTIMUM SOLUTION.

PRODUCTION SCHEDULING by LINEAR PROGRAMMING METHOD

PROBLEM:

AN AUTOMOBILE PLANT MANUFACTURES AUTOMOBILES AND TRUCKS. THE PLANT IS ORGANIZED AS FOLLOWS:

DEPARTMENTS	TIME FOR EACH CAR	TIME FOR EACH TRUCK	TOTAL TIME AVAILABLE
METAL STAMPING	40	35	9600 MINS.
ENGINE ASSEMBLY	30	60	9600 MINS.
AUTO ASSEMBLY	35	—	9600 MINS.
TRUCK ASSEMBLY	—	55	9600 MINS.

EACH CAR CONTRIBUTES \$300 TO PROFIT.
" TRUCK " \$280 " "
FIND THE OPTIMUM PRODUCTION FOR MAXIMUM PROFIT.

SET UP:

LET X_1 = No. OF CARS TO BE PRODUCED
LET X_2 = No. OF TRUCKS TO BE PRODUCED
LET X_3, X_4, X_5, X_6 = SLACK VARIABLES or IDLE TIME
LET Z = TOTAL PROFIT
THEREFORE THE FOLLOWING MAY BE WRITTEN

MET. STAMPING	$40X_1 + 35X_2 + X_3$	$= 9600$
ENG. ASSEMBLY	$30X_1 + 60X_2 + X_4$	$= 9600$
AUTO ASSEMBLY	$35X_1 + X_5$	$= 9600$
TRUCK ASSEM.	$55X_2 + X_6$	$= 9600$
PROFIT	$300X_1 + 280X_2$	$= Z$

ALGEBRAIC SOLUTION

(1)	$40X_1$	$+$	$35X_2$	$+ X_3$				$= 9600$
(2)	$30X$	$+$	$60X_2$		$+ X_4$			$= 9600$
(3)	$35X_1$	$+$				$+ X_5$		$= 9600$
(4)			$60X_2$				$+ X_6$	$= 9600$
(5)	$300X_1$	$+$	$280X_2$					$= Z$

FIRST SOLUTION

LET, $X_1 = X_2 = Z = O,\ X_3 = X_4 = X_5 = 9600 = X_6$

SECOND SOL. IN TERMS OF THE 1st

	MAX. X_1	MIN. X_1
$X_3 = 9600 - 40X_1$	240	240
$X_4 = 9600 - 30X_1$	320	
$X_5 = 9600 - 35X_1$	274	

$(1) \div 40 \rightarrow (1)^1$	$X_1 +$	$.875X_2 +$	$.025X_3$				$= 240$
$(2) - 30(1)^1 \rightarrow (2)^1$		$33.7X_2 -$	$.75X_3$	$+ X_4$			$= 2400$
$(3) - 35(1)^1 \rightarrow (3)^1$	$-$	$30.6X_2 -$	$875X_3$		$+ X_5$		$= 1200$
		$60X_2$				$+ X_6$	$= 9600$
$(5) - 300(1)^1 \rightarrow (5)^1$		$17.5X_2 +$	$7.5X_3$				$= 72{,}000$

THIRD SOL. IN TERMS OF THE 2nd

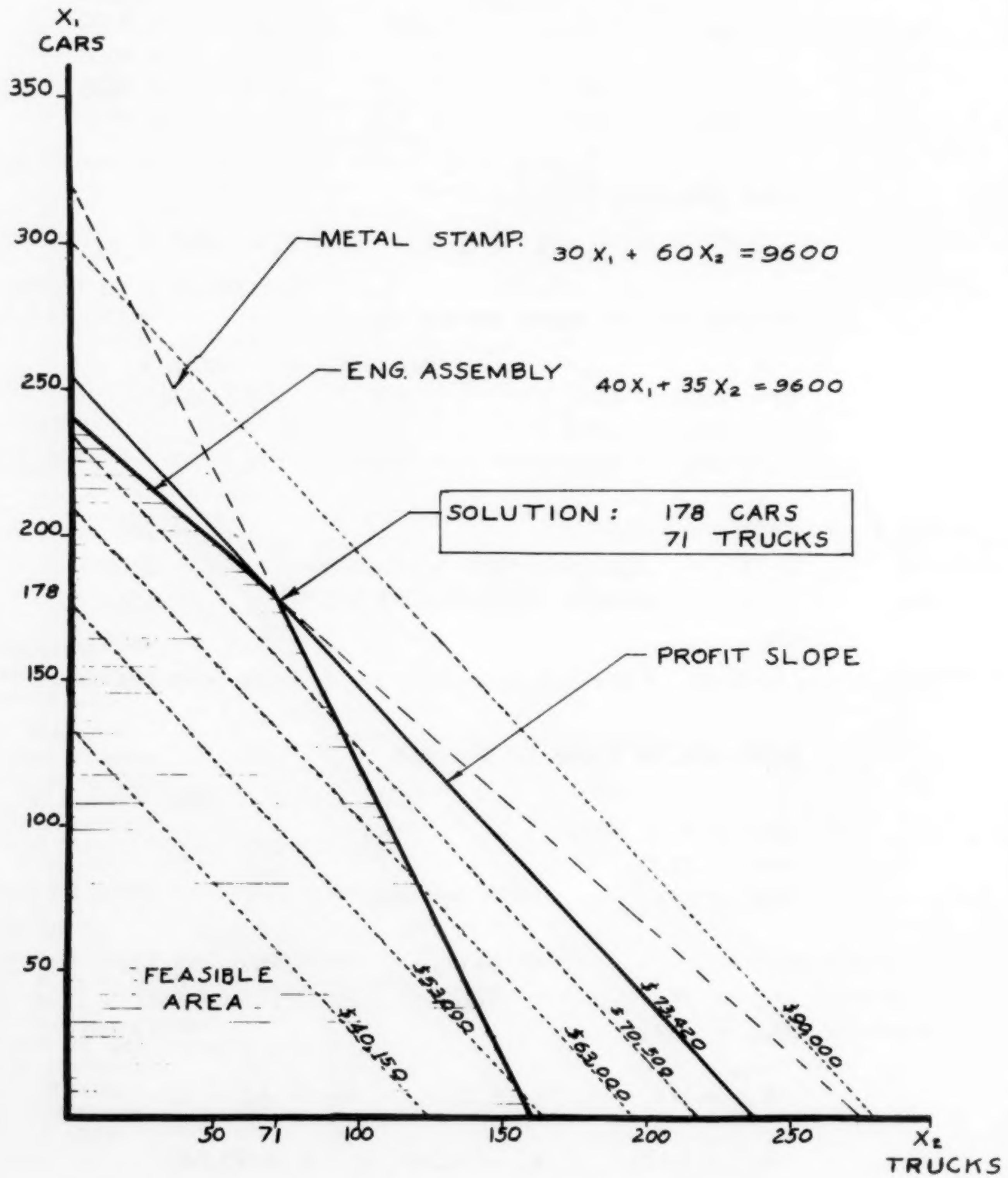
	MAX. X	MIN. X
$240 = X_1 + .875X_2$	274	
$2400 = 33.7X_2$	71	71
$9600 = 60X_2$	160	

$(1)^1 - .875(2)^{11} \rightarrow$	X_1		$+ .044X_3$	$- .026X_4$	$= 178$
$(2)^1 \div 33.7 \rightarrow (3)^{11}$		X_2	$- .022X_3$	$+ .0297X_4$	$= 71$
$(5)^1 - 17.5(2)^{11} \rightarrow$	$OX_1 +$	OX_2			$= 73{,}240$

$X_1 = 178, \quad X_2 = 71, \quad X_3 = X_4 = O$

$X_5 = 3{,}420 \quad X_6 = 5{,}340 \quad Z = 73{,}240$

GRAPHICAL SOLUTION



EDUCATION FOR BUDGETING

By
Clarence H. Jackman
California State Polytechnic College

The author recently conducted a survey for the purpose of determining (1) what educational opportunities in the field of budgeting are currently being offered by our colleges and universities; (2) what training in budgeting is being furnished to industrial employees who do perform or will likely perform some budgeting function; (3) what budget directors feel our colleges and universities should offer in a curricula for future budgeting employees and executives; and (4) what our colleges and universities might offer in budgeting education to meet industrial needs. This report is a summary of the replies from leading colleges and universities and from some of the countries largest industrial concerns. The final two paragraphs offer a challenge to NSBB to increase its contribution to the education of budgeting personnel.

SCHOOL QUESTIONNAIRE

The school questionaire was mailed to 132 colleges and universities who indicated that they offered a curriculum leading to an accounting major. One hundred ten, or 83%, of these schools replied. Exhibit 1 is a tabulation of the replies to the question regarding courses offered.

Exhibit 1

COURSES OFFERED

	No. of Schools	%
Offering budgeting as a separate course	58	53
Offering a course in Budgeting and Standard Costs	3	3
Offering a course in Budgeting and Systems	1	1
Budgeting presumed to be a major part of separate course	62	57%
Included in minor parts of other courses in:		
Cost Accounting	11	10
Managerial Accounting	2	2
Miscellaneous other courses	4	4
No budgeting course offered	31	27
	110	100%

Only fifty of the schools offering courses in budgeting indicated the hours granted for such courses (Exhibit 2.) Most of the schools granted only three semester hours credit in budgeting. This would imply that nearly all, if not all, of the schools offered only a single course in budgeting. For the purpose of analysis of this report all quarter hour replies have been converted into semester hours on the basis of three quarter hours to two semester hours.

Exhibit 2

Semester Hours of Credit Granted in Budgeting Courses

Sem. Hrs. Credit	Number of Schools	Weighted
2	17	34.0
2½	1	2.5
2-2/3	1	2.7
3	27	81.0
3-1/3	1	3.3
4	2	8.0
5	1	5.0
	50	136.5

The weighted average credit granted per school was 2.73 semester hours.

Prerequisites

"What is the earliest year in college that a student normally enrolls for the basic budgeting course?" was the next question. Most schools required that students have junior standing as a prerequisite for the basic budgeting course. Replies from the fifty-four schools answering this question are tabulated in Exhibit 3.

Exhibit 3

Academic Standing Prerequisites

Yr. in College	Number of Schools	Percentage of total
2	4	7
3	28	52
4	12	22
Graduate	10	19
	54	100%

The results of recent surveys and reports on higher business education would indicate that budgeting should be deferred until at least the junior year in college.

All of the 62 schools offering budgeting as a separate course, or as a major part of another course, listed elementary accounting as a prerequisite for such a course. Exhibit 4 presents the frequency of other course prerequisites for budgeting courses.

Exhibit 4

Frequency of Other Course Prerequisites

Course	Frequency of 62 Schools Reporting
1. Elementary Accounting	62
2. Cost Accounting	47
3. Intermediate Accounting	41
4. Economics	33
5. College Mathematics	26
6. Corporation Finance	22
7. Business Management	16

Nine schools do not require either Cost or Intermediate Accounting as a prerequisite to their budgeting course. Presumably the philosophy is to attract the non-Accounting major. Replies from industry indicate that part time budgeting duties are performed by many employees not directly connected with accounting. Many such employees would have studied elementary accounting as general business, marketing, industrial engineering or liberal arts majors.

Sixty-one of the schools answered the question regarding the type of training method used. The following results were found:

Exhibit 5

Training Methods Used

	Schools Employing Method: Frequently		Occasionally	
	No. of Schools	%	No. of Schools	%
Practice Set	10	16	4	6
Oral Reports	21	34	13	21
Case Studies	20	32	16	26
Classroom Discussions (other than case studies)	53	87	1	2
Lecturing	40	66	14	23
Problem Solving	44	72	5	8
Field Trips	2	3	14	23
Visual Aids	4	6	11	18
Guest Speakers	7	11	14	23

The leading methods, considering the schools using them frequently and occasionally, were classroom discussions other than case studies, 54 or 89%; lecturing, 54 or 89%; and problem solving, 49 or 80%. The results pertaining to the use of a practice set indicate that only 10 schools use this method frequently even though the practice set is the best training method to give the student experience in working a complete budget problem. One school commented that a practice set had been used but it involved too much time for a three semester hour course. Perhaps practice set authors may publish a shorter, but yet complete, practice set in the future so that more schools can take advantage of this type of training material.

An interesting comment was made by one school which gave as a training method "occasional meetings with local chapter of Business Budgeting group."

A disappointing, but not surprising, fact was revealed when none of the schools used film strips or motion picture films in their training. One university stated that they hope to try films in 1961 but did not state the source of supply. (It would appear that an excellent project for N.S.B.B. would be to prepare either a film or film strips that would tell the story of the importance of business budgeting as well as the activities of N.S.B.B.)

COURSE CONTENT

The last question submitted to the educators concerned course content. Fifty-four, or 87% of the 62 schools, replied to this question. The questionaire listed five types of content and each school was asked to indicate the percentage of course time spent in each of these areas of instruction. The percentages shown in Exhibit 6 are an average of the reporting schools.

Exhibit 6

Allocation of Course Time

	Average Percentage of time by 54 schools	Number of schools allocating some time
1. The use and application of budgeting	22.22	48
2. The mechanical techniques of budgeting	19.26	46
3. Budgetary control for effective management	21.85	49
4. Budget reports and variation analysis	16.20	49
5. Standard costs	4.72	18

Some schools reported devoting 5 to 30% of their course time to other areas and felt they were important enough to mention them. These areas included in their reports were as follows:

Human Relations	**Forecasting**
Budgeting and Communications	**Linear Programming**
Planning Aspects of Budgeting	**Source of Data**
Profit Planning	**Replacement Decisions**
Rate of Return	**Learning Curves**
Price Level Adjustments	**Controllership**
Managerial Decision Making	

It is interesting to note that 1/3 of the 54 schools which answered offer standard costs as part of their budgeting course. The average percentage of course time among schools offering this subject in their budgeting course is 14.16%. In most complete cost accounting courses a discussion of budgeting normally precedes the discussion of standard costs.

BUDGETING AS A GRADUATE COURSE

There was some correlation among the ten schools offering budgeting as a graduate course insofar as prerequisities, methods of teaching and course content is concerned.

The average credit granted was three credit hours. Classroom discussions, lectures, and problem solving are the predominant training methods. Most of the ten schools specifically required Cost and Intermediate Accounting, but the other specific prerequisites varied.

Only three of the ten schools included standard costs in their course content. The balance of the course was generally equally divided between the other four major types of content listed on the questionaire (see Exhibit 6). One school reported two other types of content, namely forecasting methods and sources of data. Each of these occupied 20% of the course content at that instituition.

BUDGETING EDUCATION IN BUSINESS

An industrial questionaire was mailed to 153 business establishments including some of the largest in the nation based on volume, number of employees, and total capital. A few medium sized establishments were also included.

Replies were received from only 63 firms or 41%. Many of the 63 replies were incomplete because the budgeting activities of so many large firms were too decentralized. With most budgeting functions in subsidiaries, branch factories, warehouses, stores, and offices the budgeting directors could answer all questions only by querying each unit, consuming much of their time and causing delays in replying. Apparently educational activities and the number of personnel working in budgeting was not being reported to the home offices of these firms.

The average total number of employees of the firms replying were 55,664 while the average number of employees working primarily in a budgeting capacity was 38. The ratio of total employees to budgeting personnel was 1,465 to 1.

The number of employees obtaining education and training in some field of business budgeting varied widely among the firms queried. One firms stated "Our training program, enrollment 7500, is a Manufacturing Budget Training Course designed for management people, aimed most

specifically at foremen." Such personnel would not be performing budgeting duties primarily.

Another firm replied that ten of their twenty budgeting employees were attending an evening school. Other firms, however, reported only four or less employees obtaining budgeting education or training. Nine firms implied no training in budgeting was being acquired.

The major sources of education and training of employees in budgeting was on-the-job training and evening college.

Exhibit 7

Source of Training and Education	Number of Firms
Correspondence	3
Evening College	8
Company School	2
On-the-job Training	25
Trade Association School	1
A.M.A. Conference and Seminars	2
N.A.A. Seminars	1
Membership in N.S.B.B.	1
Life Office Management Association Exams	1

Many firms stated that training was not necessary since budgeting employees were mainly people with college degrees (usually accounting majors) who have come up through accounting departments into budgeting offices.

Only two firms allowed their employees to acquire budgeting education on company time.

DESIRED EDUCATION FOR BUDGET JOBS

Another question pertained to the number of hours of credit in certain courses that should be taken by people who desire to do budgeting work. The replies from thirty reporting firms appear in Exhibit 8:

Exhibit 8

Number of Hours of College Credit Desired for Budgeting

Personnel	Average Hours Cr.	Number of Firms desiring the course
a) Elementary Accounting	4.9	28
b) Intermediate Accounting	4.6	27
c) Cost Accounting	3.7	27
d) Managerial Accounting	3.9	26
e) Budgeting	4.9	29
f) Corporation Finance	3.5	28
g) Economics	6.1	28
h) Business Marketing	3.4	21
i) College Mathematics	6.4	27
j) English	8.0	27
k) Report Writing	3.6	26

It was interesting that so many of the firms recommended that some hours be taken in most of the courses listed above.

NOTABLE COMMENTS FROM INDUSTRY

Many firms did not directly answer the questions objectively, but presented interesting points of view worth citing. The following comments express opinions of some firms as to the importance of budgeting in their company:

"We should like to point out that we do not establish budgets for ordinary operating expenses. Budgets are employed only in those areas where the level of expenditure is established by major policy decision. This latter category includes capital expenditures, oil and gas exploration, research, advertising, and donations and membership."

"For your information, this company does not extensively budget expenses and therefore we do not have a budget director, nor budget accounting departments. We do some budgeting in our administrative and advertising expenses, however, since this is a small part of our expenses, we do not feel that we could be of any help in answering your questionaire."

(Continued on page 17)

TOPICAL INDEX Included In This Issue

On pages 13 to 16 of this issue of BUSINESS BUDGETING you will find a TOPICAL INDEX of all articles that have appeared in BUSINESS BUDGETING (and its predecessor publications) covering the period from 1952 through June, 1960. This index was bound into the center of the magazine so that it can be easily removed for permanent filing. Merely pull away from the staples and the INDEX is free.